Screening Consortium in the design of the mammography use and sociodemographic questions included in the survey instruments.

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A B S T R A C T

Objectives. This study examined errors in estimating household gun ownership that result from interviewing only 1 adult per household.

Methods. Data from 2 recent telephone surveys and a series of in-person surveys were used to compare reports of household gun ownership by husbands and wives.

Results. In the telephone surveys, the rate of household gun ownership reported by husbands exceeded wives' reports by an average of 12 percentage points; husbands' reports also implied 43.3 million more guns. The median "gender gap" in recent in-person surveys is 7 percentage points.

Conclusions. Future research should focus on respondents' reports about personally owned guns. (*Am J Public Health.* 1998;88:1715–1718)

The Gender Gap in Reporting Household Gun Ownership

Jens Ludwig, PhD, Philip J. Cook, PhD, and Tom W. Smith, PhD

How many households contain firearms, and how many guns do members of these households own? This question is of considerable importance given evidence that keeping a firearm in the home is associated with elevated rates of homicide, suicide, and fatal gun accidents.[1–7]

In this article, we study measurement errors in survey estimates that result from asking only 1 adult from each selected household to report on household gun ownership, a practice motivated by considerations of surveying costs.[8] While comparisons between self-reported personal gun ownership and data from administrative records reveal low false-negative rates,[9,10] little is known about the degree to which respondents may misreport about guns kept by other household members.[11,12]

Methods

In order to learn more about the accuracy of reports on household gun ownership, we compared the responses of husbands and wives using data from 3 recent surveys. Husbands and wives were reporting on the same event (gun ownership in households containing a married couple), but wives were more likely to be proxy reporters for someone else's gun in the home, since men are more likely to own firearms.[13–15] Because of social desirability bias,[16] false positives are expected to be rare relative to false negatives; thus, the larger of the 2 estimates is likely to be more accurate.

We also assessed the relative accuracy of husband and wife reports by comparing the gun stocks implied by the responses of each

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Note. Opinions and mistakes are those of the authors alone.

TABLE 1—Gun Ownership Estimated From Reports of Husbands and Wives

Parameter and Survey	Husbands	Wives	Gap
Personal gun ownership, % (95% CI)			
NSPOF	46.8 (43.1, 50.5)	9.3 (7.2, 11.4)	. . .
Gallup	49.5 (43.7, 55.3)	14.5 (10.2, 18.8)	. . .
GSS (1994–1996)[a]	54.1 (50.7, 57.5)	13.0 (10.8, 15.2)	. . .
Household gun ownership, % (95% CI)			
NSPOF	49.1 (45.3, 52.9)	37.0 (33.5, 40.5)	12.1 (6.9, 17.3)
Gallup	52.3 (46.4, 58.2)	40.5 (34.6, 46.4)	11.8 (3.5, 20.1)
GSS			
1980	61.1 (56.2, 66.1)	58.8 (53.0, 64.6)	2.3 (–5.3, 9.9)
1982	58.3 (53.6, 63.0)	54.1 (49.5, 58.7)	4.2 (–2.4, 10.8)
1984	56.7 (51.2, 62.2)	56.9 (52.1, 61.7)	–0.2 (–7.5, 7.1)
1985	61.0 (56.1, 65.9)	53.7 (48.8, 58.6)	7.3 (0.4, 14.2)
1987	60.2 (55.2, 65.2)	56.4 (51.7, 61.1)	3.8 (–3.0, 10.6)
1988	57.9 (50.9, 64.6)	52.3 (46.1, 58.5)	5.6 (–3.6, 14.8)
1989	62.1 (55.9, 68.3)	54.6 (48.7, 60.5)	7.5 (–1.0, 16.0)
1990	58.6 (52.1, 65.1)	51.6 (44.9, 58.3)	7.0 (–2.4, 16.4)
1991	60.9 (54.4, 67.4)	50.4 (44.0, 56.8)	10.5 (1.3, 19.7)
1993	56.4 (50.1, 62.7)	50.6 (44.4, 56.8)	5.8 (–3.0, 14.6)
1994	57.7 (53.1, 62.3)	50.5 (46.1, 54.9)	7.2 (0.1, 13.6)
1996	53.6 (48.7, 58.5)	52.0 (47.3, 56.7)	1.6 (–5.3, 8.5)
Guns per gun household			
NSPOF			
Mean (95% CI)	4.3 (3.8, 4.8)	3.0 (2.7, 3.3)	1.3 (0.7, 1.9)
50th percentile	3.0	2.0	1.0
90th percentile	9.0	6.0	3.0
No.	407	359	. . .
Gallup			
Mean (95% CI)	4.8 (3.1, 6.5)	4.7 (3.1, 6.3)	0.1 (–2.4, 2.4)
50th percentile	3.0	3.0	0.0
90th percentile	10.0	8.0	2.0
No.	126	93	. . .
Total gun stock in marital households,[b] millions (95% CI)			
NSPOF	113.7 (97.8, 129.6)	59.8 (51.6, 68.0)	53.9 (18.1, 89.7)
Gallup	135.2 (84.9, 185.5)	102.5 (64.5, 140.5)	32.7 (–30.4, 95.8)

Note. For the NSPOF and GSS, we restricted the sample to married respondents who reported living in a household containing at least 2 adults. For the Gallup, we include the proportion of respondents who reported a gun in the home combined with the proportion of respondents who reported a gun elsewhere on their property, such as in a garage, shed, or car. CI = confidence interval; NSPOF = National Study of the Private Ownership of Firearms; GSS = General Social Survey.

[a]Restricted to households with telephones.

[b]Calculated as the average number of guns reported by husbands multiplied by the estimated proportion of marital households owning guns, derived from husband reports multiplied by total number of marital households (and a similar method for wives). Standard errors were calculated with approximation for variance of the product of 2 random variables.[17]

group with firearms sales data. Gun stocks were calculated as the product of estimated household ownership rates and number of guns per firearm-containing household; standard errors were calculated via the approximation given by the following formula[17]:

$$\mathrm{Var}(XY) \approx [(1/N)\Sigma_i(y_i)]^2\sigma^2_x + [(1/N)\Sigma_i(x_i)]^2\sigma^2_y + \sigma^2_x\sigma^2_y,$$

where X and Y are random variables representing household ownership and the number of guns per firearm-containing households, respectively; $(1/N)\Sigma_i(x_i)$ and $(1/N)\Sigma_i(y_i)$ represent the sample averages of X and Y; and σ^2_x and σ^2_y represent the variances of the 2 random variables. Cumulative sales figures may overstate the civilian gun stock because of depreciation, although more than two thirds of all guns sold in the United States since 1899 were made within the past 40 years.[12,18]

The 1994 National Study of the Private Ownership of Firearms was a telephone survey of 2568 adults.[13] Each adult was asked, "Do you or any members of your household 18 years of age or older currently have any firearms in your home, car, or elsewhere around your home? Do not include airguns, toys, models, or starter pistols."

The July 1997 Gallup telephone survey interviewed 1008 adults, each of whom was asked, "Do you have a gun in your house?" and "Do you have a gun anywhere else on your property such as in your garage, barn, shed, or in your car or truck?"

We also used data from the National Opinion Research Center/University of Chicago's General Social Survey for the years 1980 through 1996. This survey includes the question "Do you happen to have in your home (or garage) any guns or revolvers?"[19]

Each of these surveys interviewed only 1 adult from each household in the sample, selected by a process designed to be equivalent to random. We excluded from the General Social Survey those households without telephones and focused, in both the General Social Survey and the National Study of the Private Ownership of Firearms, on married respondents living in a household with at least 2 adults.

Results

Each of the surveys allowed estimates of personal gun ownership as well as household possession. This is an important distinction because, in most families, a gun is viewed by

TABLE 2—National Household Prevalence and Number of Guns Estimated Directly and With Adjustment for Wives' Underreport

Survey	Estimated Prevalence		Estimated No.[a] (Millions)	
	As Measured, % (95% CI)	Adjusted, % (95% CI)	As Measured (95% CI)	Adjusted (95% CI)
NSPOF (1994) (n = 2568)	34.5 (32.6, 36.4)	38.0 (33.3, 42.7)	121.2 (110.9, 131.5)	150.0 (133.2, 166.8)
Gallup (1996) (n = 1008)	40.8 (37.7, 43.9)	44.0 (36.5, 51.5)	167.6 (133.4, 201.8)	183.7 (131.8, 235.6)
GSS (1994–1996)[b] (n = 3884)	44.3 (42.7, 45.9)	45.7 (41.7, 49.7)	. . .	. . .

Note. Adjustments applied the prevalence and average number reported by husbands to all marital households. Standard errors were calculated as the square root of the sum of the variance for the estimated ownership rate (or gun stock) for married households, calculated from husbands' responses, and the variance for the estimated ownership rate (or gun stock) for unmarried households, calculated from all unmarried respondents' reports. For the NSPOF and GSS, we restricted the sample to married respondents who reported living in a household containing at least 2 adults. For the Gallup survey, we include respondents who reported a gun in the home and respondents who reported a gun elsewhere on their property, such as in a garage, shed, or car. CI = confidence interval; NSPOF = National Study of the Private Ownership of Firearms; GSS = General Social Survey.

[a]Estimated by calculating average number of guns in telephone households multiplied by number of households. Standard errors were calculated with approximation for variance of the product of 2 random variables.[17] The NSPOF stock figures reported are substantially lower than the estimate of 192 million guns derived from self-reported gun ownership.[13]

[b]Calculated after excluding households without telephones.

all concerned as the private property of a particular family member. This fact was documented in the Gallup survey, which found that only 5.4% of respondents who reported guns in their home indicated that there was joint ownership for one or more of them.

Table 1 shows that husbands were 4 or 5 times as likely to personally own a gun as their wives. Husbands were also more likely than wives to report household gun ownership, with gaps of approximately 12 percentage points in the 2 telephone surveys. The median gender gap in the General Social Survey since 1988 is 7 percentage points. Our findings are consistent with those reported elsewhere.[13,20,21]

In the 2 surveys that included a follow-up question on the number of guns in the home, husbands reported more than did wives in the National Study of the Private Ownership of Firearms but not in the Gallup survey, although even the latter showed a gap of 2 guns at the 90th percentile (Table 1). The gun stock in marital households that was indicated by husbands' reports was larger than that reported by wives by an average of 43.3 million.

Table 2 shows the consequences of these differences. Included are national estimates using all households, as well as the results of applying the husband-reported prevalence and average count to all marital households. The adjusted prevalence estimates for the National Study of the Private Ownership of Firearms and the Gallup survey were higher than the unadjusted estimates by 3.5 and 3.2 percentage points, respectively. The adjusted gun stock estimates were also closer to the number of guns (223 million) that entered into private hands in the United States between 1899 and 1993.[18]

Yet, even the adjusted gun stock estimates in Table 2 are lower than estimates derived by using self-reports of personal (rather than household) gun ownership and multiplying by the total number of adults (rather than the total number of households). In the National Study of the Private Ownership of Firearms, this implies a gun stock of 192 million.[13]

Discussion

Our results suggest that wives underreport guns in the home and pose a challenge to the assumption, incorporated in most surveys on this subject, that any adult in the household will be a reliable reporter of household gun ownership. Ambiguity in whether the survey questions asked about personal or household ownership could explain some of the gender gap, although the survey with the least ambiguous question (the National Study of the Private Ownership of Firearms) involved the largest gap. Alternatively, gun ownership may be a sensitive behavior subject to social desirability bias, with interview mode effects[22,23] that may be more pronounced among women because they are more likely than men to be anti-gun.[13,24] Lack of awareness may also explain part of the gender gap. Some wives may not know about their husbands' guns, either because wives are less interested in guns or because some husbands are reluctant to reveal their gun ownership. This last possibility is suggested by the recent finding that 11% of married respondents recalled a disagreement in their household in which a woman opposed keeping a gun in the home.[24,25] Sampling does not appear to explain much of the gender gap, since gaps were small on questions about nonsensitive behaviors.[20]

We suggest that future survey research on gun-related topics focus, whenever possible, on respondents' reports about their own guns; because of the household misreporting issues noted here, self-reports of gun ownership appear to produce more accurate estimates of America's gun stock than do reports about household guns. □

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Nighttime Observations of Safety Belt Use: An Evaluation of California's Primary Law

James E. Lange, PhD, and Robert B. Voas, PhD

ABSTRACT

Objectives. An analysis was conducted to determine what effect California's change to a primary safety belt law had on safety belt use among nighttime weekend drivers.

Methods. Observations of 18 469 drivers in 2 California communities were made during voluntary roadside surveys conducted every other Friday and Saturday night from 9 PM to 2 AM for 4 years.

Results. Rates of safety belt use rose from 73.0% to 95.6% ($P < .0005$). For drivers with blood alcohol concentrations of 0.10 or higher, rates rose from 53.4% to 92.1% ($P < .0005$).

Conclusions. Because substantial improvement in safety belt use was seen even in a group of high-risk drivers, the injury reduction benefits of this law may be high. (*Am J Public Health.* 1998;88:1718–1720)

On January 1, 1993, California became the first state in the United States to modify an existing safety belt law from a secondary to a primary enforcement law.[1] The primary law gives police the authority to stop a vehicle solely on the basis of their observation of noncompliance with the safety belt law. The secondary law permitted police officers to cite unbelted occupants only when the vehicle was stopped for another violation.

Immediately after implementation of the primary enforcement law, a California statewide telephone survey[1] found that 55% of respondents reported increased use of safety belts. Daytime observation studies at traffic intersections found use rate increases of between 13 and 20 percentage points,[2,3] and Winnicki's[4] time-series graph of California's Fatality Analysis Reporting System data indicates an approximately 15 percentage point increase in usage rates among drivers and passengers.

Observation studies in California reported to date have been conducted only during the day. By excluding nighttime weekend drivers, they may be omitting a particularly high-risk segment of the driving population. Analyses of fatal accident statistics are problematic because inclusion in the fatality sample is dependent, in part, on safety belt use. Further, some risky behaviors, such as alcohol use, are correlated both with fatal accidents and with failing to use a safety belt,[5] so changes in these risk variables may have consequences for safety belt use that are not related to safety belt laws.

Community Roadside Surveys

Oceanside and Salinas in California were sites for an experimental, community-

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Note. The opinions stated in this report are not necessarily those of the National Institute on Alcohol Abuse and Alcoholism or the Center for Substance Abuse Prevention.